THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PATRIZIO VINCIARELLI and LOUIS A. BUFANO

Appeal No. 98-0130
Application No. 08/631,793

ON BRIEF[1]

Before HAIRSTON, FLEMING, and LEVY, ***Administrative Patent Judges***.

LEVY, ***Administrative Patent Judge***.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1, 2, 4-12, 15-17, 19-24, and 42, which are all of the claims pending in this application.

BACKGROUND

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[1] The Oral hearing scheduled for June 7, 2000 was waived by appellant in a document received by facsimile on June 5, 2000.

The appellant's invention relates to a power converter having a magnetically coupled control. Specifically, first (32) and second (30) circuit assemblies are mechanically separable (figure 2) and include communicators (120, 121) which are electromagnetically coupled by windings (40, 42) for passing control information by modulating a carrier signal (figure 8). An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced as follows:

1. Power converter apparatus comprising

a transformer having galvanically isolated windings defining a primary side and a secondary side of said power conversion apparatus,

a switch for coupling power from a source on the primary side via the transformer to a load on the secondary side,

a first circuit assembly having primary-side circuitry galvanically coupled to a port for connection to an input power source, said primary-side circuitry including a primary-side communicator for sending or receiving control information used in controlling operation of the power conversion apparatus,

a second circuit assembly having secondary-side circuitry galvanically coupled to a port for connection to a load, said secondary-side circuitry including a secondary-side communicator for sending or receiving said control information, and

circuitry for passing said control information by modulating a carrier,

the first and second circuit assemblies being mechanically separable as assemblies from one another, galvanically isolated from one another, and configured to be placed in positions relative to one another to enable said primary-side and secondary-side communicators to cooperate to pass said control information,

said primary-side communicator and said secondary-side communicator being electromagnetically coupled by windings for passing said control information on said carrier.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Snow et al (Snow)	4,683,528	Jul. 28, 1997
Gillett et al (Gillett)	4,868,732	Sep. 19, 1989

Claims 1, 2, 4-12, 15-17, 19-24, and 42 stand rejected under 35 U.S.C. § 103 as being unpatentable over Snow in view of Gillett.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the final rejection (Paper No. 18, mailed July 30, 1996) and the examiner's answer (Paper No. 25, mailed July 3, 1997) for the examiner's complete reasoning in support of the rejections, and to the appellants' brief (Paper No. 24, filed March 31, 1997) and reply brief

(Paper No. 27, filed September 4, 1997) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants specification and claims, to the applied prior art references, and to the respective positions articulated by the appellant and the examiner. As a consequence of our review, we will reverse the rejection of claims 1, 2, 4-12, 15-17, 19-24, and 42 under 35 U.S.C. § 103 as unpatentable over Snow in view of Gillett.

The examiner has failed to set forth a ***prima facie*** case. It is the burden of the examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the express teachings or suggestions found in the prior art, or by implications contained in such teachings or suggestions. ***In re Sernaker***, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983).

Turning first to claim 1, appellants assert (brief, pages 11 and 12) that :

> Claim 1 requires primary-side circuitry and secondary-side circuit assemblies which are mechanically

> separable from one another. Further, claim 1 requires that the two sides' circuitry include communicators which are electromechanically coupled by windings for passing control information by modulating a carrier.
>
> None of the cited references show mechanically separable primary-side and secondary-side circuit assemblies with communicators which are electromagnetically coupled by windings for passing control information by modulating a carrier.

The examiner states (final rejection, page 4) that Snow teaches:

> a power converter as recited by claims 1, . . . except for utilizing mechanically separate assemblies. Gillett et al teaches as old and known in the art at the time of the invention power converters utilizing mechanically separable assemblies (120 and 160) for easy interchangeability of assemblies. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the power converter of Snow et al by utilizing mechanically separable assemblies for ease of interchangeability of assemblies as taught by Gillett et al.

Additionally, the examiner takes the position (Answer, page 4) that Snow teaches (col. 1, lines 41-45) that magnetically coupled feedback via a modulated carrier was old and known in the art prior to Snow's invention of an improved feedback arrangement.

In order to reach the conclusion arrived at by the examiner, we would first have to modify Snow to replace the

pulse position modulation circuitry with circuitry for passing the control information by modulating a carrier. After this were done, we would then have to make the first and second circuit assemblies, each of which includes a communicator for sending or receiving the control information, mechanically separable as assemblies from one another for passing control information by modulating a carrier.

Turning first to the issue of modifying Snow to replace the pulse position modulation circuitry with circuitry for passing the control information by modulating a carrier, we note at the outset that whether or not the pulse position modulation of Snow or the pulse width modulation of Gillett include modulation of a carrier is not before us on review in this appeal as both appellant and the examiner are in agreement that neither the pulse position modulation of Snow nor the pulse width modulation of Gillett includes modulation of a carrier.[2]

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[2] Appellants state (Answer, page 12) "Furthermore, while Snow shows passing control information from the primary side to the secondary side through windings, Fig. 1, col. 3, ll.2-12, it is done by pulse modulation, not by modulating a carrier. See Figs. 4A, 4B (showing pulse modulation without a carrier). Gillett shows . . . control information is passed through pulse width modulation, not by modulating a carrier. Fig. 2 (element 42); col. 3, ll. 25-34." Appellants additionally state (Reply Brief, page 2) that

The examiner and appellant are also in agreement that Snow discloses (col. 1, lines 43-48) that it was known in the prior art to provide amplitude modulation of a carrier signal with feedback information, both recognizing that Snow's invention is directed to pulse position modulation (**See** Reply Brief, pages 2 and 3; and Answer, page 4). Accordingly, the issue is whether it would have been obvious to one of ordinary skill in the art to have replaced the pulse position circuitry of Snow with circuitry for modulation of a carrier signal as noted by Snow to have been known in the art.

We find that Snow discloses (Spec. col. 1, lines 40-47) that an approach taken was "to amplitude modulate a high frequency carrier signal with the desired feedback information. . . However, this latter approach has often required in addition to a complex integrated circuit, several

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"modulating a carrier, as required by claim 1, is not pulse width modulation (or PWM). Carrier modulation provides continuous, instantaneous feedback of the error signal, while PWM does not module modulate a carrier and provides feedback of only sampled error signals." The examiner's position (Answer, page 4) is that "Gillett et al teaches a power converter including mechanically separable components but not including magnetically coupled feedback via a modulated carrier." The examiner further states (Answer, pages 5 and 6) that Snow teaches "pulse width modulation that Snow felt was superior to modulating a carrier signal."

components to demodulate amplitude modulated carrier signal." Snow's invention (col. 1, line 50 col. 2, line 9) provides for a regulator for a power supply which reduced the number of components and manufacturing costs by utilizing pulse position modulation to directly control the duty cycle of the switch drive signal.

The mere fact that Snow discloses that it was known to modulate a carrier signal with feedback information, merely establishes that modulation of a carrier signal is within the scope and content of the prior art. This does not, in and of itself, establish obviousness. It merely begs the point. To make the modification advanced by the examiner of replacing circuitry for pulse position modulation circuitry with circuitry for modulating a carrier signal, there would need to have been a suggestion or teaching in the prior art. Snow specifically teaches away from utilizing carrier modulation to avoid the additional complex integrated circuit, several components to demodulate the amplitude modulated carrier signal (col. 1, lines 41-48) associated with modulating a carrier. By utilizing pulse position modulation circuitry instead of amplitude modulating a high frequency carrier

signal, Snow provides an improved regulator that is (col. 1, line 53) "relatively uncomplicated in design" and (col. 1, lines 56-57) "in which the number of components and the manufacturing costs are reduced." Snow additionally states (col. 5, lines 13-17) that "the feedback pulse can be used to directly determine the turn on point and no demodulation is necessary. This technique maintains the high linearity for accurate regulation and requires a relative minimum of circuitry."

Accordingly, we find that Snow clearly teaches away from modulating a carrier signal with feedback information. We therefore conclude that the examiner has not met the burden of establishing why one having ordinary skill in the art would have been led to the claimed invention by the express teachings or suggestions found in the prior art, or by implications contained in such teachings or suggestions.

We now turn to the second issue of making the first and second circuit assemblies, each of which includes a communicator for sending or receiving the control information, mechanically separable as assemblies from one another.

While we agree with the examiner that Gillett does teach mechanically separable primary and secondary side components (figures 2 - 4) for a power converter, we are in agreement with appellant (Brief, page 14) that there is no suggestion in the prior art to make the primary and secondary circuits of Snow separable as advanced by the examiner.

We find that in Gillett, the pulse width modulation control circuit (40) which controls switch (38) is part of the primary drive circuits (10) as shown in figures (1) and (2). Gillett discloses (col. 3, lines 22-24) primary drive circuits (10), primary windings (12, 14, 16, and 18), and power transformer cores (20, 22, 24, and 26). The primary drive circuits (10) include voltage supply (36), a transistor switch (38), and oscillator driven pulse width modulation control (40) which is responsive to a feedback signal on line (42) to vary the “On” time of each cycle of operation of switch (38) so as to maintain the output voltage sensed on line (42) at a desired level with respect to a reference voltage in control circuit (40) (See col. 3, lines 25-34). In addition, Gillett discloses that secondary windings (28, 30 and 32), (also referred to by Gillett as power output windings), drive output

circuits (50, 52 and 54), (also referred to by Gillett as secondary structures), and that the secondary structures (50, 52, and 54) “are separable from the remainder of the circuit thus far described, resulting in two complementary subset structures (120 and 140).” (See col. 3, lines 58-61). Figure (2)of Gillett shows (col. 3, lines 61-63) subset (120) which includes most of the heavy and bulky elements and figure (3) shows the other subset (140). In use, subset (120) might be carried by a machine frame and subset (140) might be part of a circuit card pluggable into the machine frame (col. 3, lines 63-66). The organization described (figures 1-3) provides a replaceable circuit package, which may be either the base portion (120) or the card portion (140) (See col. 4, lines 5-7, and figure 4). The load (functional card 160) incorporates subset (140) in addition to the operational circuits normally found on a functional card. Any necessary control/regulation signal, as on line (42) is fed back from the load (functional card) to the power supply (36) via magnetic coupling “a small signal version of the flux link connectors” (col. 5, lines (See col. 4, lines 12-16, and col. 5, lines 11-18).

We therefore find that Gillett discloses that secondary windings (28, 30 and 32) and secondary structures (50, 52 and 54), are separable from the remainder of the circuit, resulting in two complementary subset structures (120 and 140) in order to include most of the heavy and bulky elements on subset (120) so that they may be carried by a machine frame and subset (140) might be part of a circuit card pluggable into the machine frame (col. 3, lines 63-66). However, Snow is concerned with having a regulator circuit in which "the number of components and manufacturing costs are reduced" (col. 1, lines 56-57). As Snow is concerned with reducing both the number of components and the manufacturing costs, and teaches away from mechanically separating the primary-side and secondary-side assemblies, we find no teaching or suggestion to increase the number of components, as well as the manufacturing costs, by separating the primary-side and secondary-side circuit assemblies into mechanically separate components. As Snow teaches away from mechanically separating the primary and secondary circuit assemblies, we therefore find no suggestion or teaching in the prior art to separate

the power supply regulator of Snow into mechanically separable components.

In summary, we find no suggestion or teaching in the prior art references to Snow or Gillett that would lead one of ordinary skill in the art to the claimed invention. Accordingly, the rejection of claim 1 is reversed.

With regard to claims 12, 15 and 42, which are all of the other independent claims in the application, we find that these claims have similar language to claim 1. Accordingly, the rejection of claims 12, 15 and 42 is reversed. As claims 2-10 depend from claim 1, and claims 16, 17 and 19-24 depend from claim 15, the rejection of claims 2-10, 16, 17 and 19-24 is also reversed.

SUMMARY

To summarize, the decision of the examiner to reject claims 1, 2, 4-12, 15-17, 19-24 and 42 under 35 U.S.C. § 103 is reversed.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	)	
MICHAEL R. FLEMING Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
STUART S. LEVY Administrative Patent Judge	)	

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